EMERGENCY OPTICAL SIGNALLING DEVICE

Technical field

The invention relates to an emergency optical signalling device.

The signalling device is particularly suitable for installation on public utility vehicles and transport means, for example transport means used by the police, fire brigade and rescue services, especially in combination with acoustic signalling devices.

Background art

It is known that public utility transport means, such as the vehicles used by the police and rescue services in general, are equipped with optical and acoustic signalling devices which are activated in the event of an emergency in order to signal the presence of the vehicles and request priority in heavy traffic conditions.

With the same aims, the same signalling devices may also be used on watercraft and airborne vehicles.

The combination of the acoustic signalling devices with the optical signalling devices is necessary because the former, generally a siren, by means of their sound indicate that there is an emergency, while the optical signalling devices allow precise determination of the direction from which the rescue vehicle is coming so that the traffic occupying the roadway may move aside and allow the vehicle to pass through.

The advantages of the signalling system are therefore based on the efficiency of both the signalling devices and in particular their use in combination with each other.

The optical and acoustic signalling devices of the known type present on the

market and widely used have, however, certain drawbacks.

A first limitation consists in the fact that, while the acoustic signalling devices use a siren, the sound of which can be heard from far away in any environmental conditions, the visibility of the light beam emitted by the optical signalling devices is instead reduced, for example in the case of rain or fog.

In fact, the optical signalling devices of the known type use incandescent or halogen lamps which generate a light ray which is projected over a certain distance by a rotating directional dish, but which, because of the incoherent nature of the radiation forming it, is greatly absorbed by the water droplets which form the rain or the fog.

The result is that, in the event of particularly dense fog, the light ray is visible no more than a few metres from the lamp which emits it.

DE-A-4012120, which is considered the closest prior art to the invention, discloses an optical signalling device according to the preamble of claim 1.

Further optical signalling devices are known from US-B-6183100, WOA-01/45980 and GB-A-2 360 350.

However, none of the optical signalling devices disclosed in such prior art documents permits to envelope the vehicle on which is mounted making it clearly visible at a great distance.

Disclosure of the invention

The present invention aims to improve the abovementioned prior art documents and by providing an optical signalling device, the function of which is to generate a light ray which is not attenuated by rain or fog.

Another object is that the optical signalling device according to the invention should emit a light ray which is more clearly visible in the fog compared to signalling devices of the known type.

Last but not least, the optical signalling device according to the invention may be designed with dimensions which are comparable to those of known devices.

These and other objects are achieved by means of an optical signalling device for a vehicle or movable transport means in accordance with the main claim 1.

Thanks to this arrangement, the optical signalling device according to the invention is effective in particular in the case of fog since the rays of coherent light emitted by the laser, unlike the rays of incoherent light emitted by halogen or incandescent lamps of the known type, are more clearly visible in the fog and define in foggy conditions a visible luminous cone which envelopes the vehicle like a hood and which moves together with the vehicle, making it clearly distinguishable at a great distance.

Brief description of the drawings

Further features and advantages of the invention will be more clearly understood from the detailed description of a preferred but not exclusive embodiment of the invention, illustrated by way of a non-limiting example with the aid of the accompanying drawings in which:

- FIG. 1 shows an axonometric view of a vehicle to which the optical signalling device according to the invention has been applied;
- FIG. 2 shows a longitudinal section through the signalling device according to the invention;
- FIG. 3 shows a cross-section through the signalling device according to the invention;
- FIG. 4 shows an axonometric view of the signalling device according to the invention applied to a motor vehicle, during operation;

- FIG. 5 shows a variation of embodiment of the signalling device according to the invention applied to a motor vehicle, during operation;
- FIG. 6 shows a further variation of embodiment of the invention.

Detailed description of a preferred embodiment

During the course of the description the terms "laser light emitter" and "laser light generator" will be regarded as equivalent in the sense that the emitter and the generator may form a single element or separate elements.

Moreover, the signalling device according to the invention may be applied to any self-propelled or motorised vehicle or means.

The signalling device according to the invention is illustrated in FIG. 1 where it has been denoted overall by 1 and is fitted to the roof of a motor vehicle denoted overall by A.

It is nevertheless understood that the signalling device may be applied to any vehicle or means and will be particularly useful for public utility vehicles such as the transport means used by the police, rescue and emergency services, fire brigade and the like.

With reference to FIGS. 2 and 3, the signalling device 1 comprises a support element 2 which may be fitted by means of fixing means of a type known per se to the roof of the motor vehicle A. The element 2 is able to receive a revolving element 3 coupled to drive means comprising, for example, an electric motor 4 and, if necessary, reducer (not shown in the drawings).

The revolving element 3 is covered by a transparent cap 5, the bottom edge of which is engaged with the support element 2, and comprises an internally hollow cylindrical body 7 which defines an axis of rotation X arranged vertically.

One or more optical signalling elements, overall denoted by 8, are housed inside the cylindrical body 7 and, according to the invention, consist of one or more laser light generators/emitters 9.

It is particularly pointed out that the side wall 10 of the cylindrical body 7 is provided with one or more seats 11 each of which houses a respective generator/emitter 9 which emits a laser light ray L through an emission hole 11a coaxial with the respective seat 11.

Each seat 11 and the respective emission hole 11a define a longitudinal axis Y which is inclined with respect to the longitudinal axis of rotation X of the cylindrical body 7 and is directed towards the plane of travel P of the vehicle A.

More precisely, the longitudinal axes Y of the emission holes 11a are arranged so as to form a conical surface 12 having its vertex 13 along the longitudinal axis of rotation X and its base directed towards the plane of travel P of said vehicle A.

In order to emit light, each of the generators/emitters 9 must be supplied with electric current and for this purpose a rotating distributor 15 is provided between the electric motor 4 and the cylindrical body 7.

The rotating distributor 15, which is of the type known per se, has the stator part 16 fixed to the support element 2 and the rotor part 17 fixed to the cylindrical body 7 and to the shaft 4a of the electric motor 4.

In turn each generator/emitter 9 has two electric power supply cables 9a and 9b which are connected respectively to the stator 16 and to the rotor 17 of the rotating distributor 15.

In turn, the stator 16 and the rotor 17 are connected by means of cables 16a and 17a to an electric power source.

The electric motor 4 is also connected by means of cables 4b and 4c to the same electric power source which, preferably but not necessarily, consists of the battery of the motor vehicle A.

In use, when the optical signalling device is in operation and the motor car A is travelling in fog, as shown in FIG. 4, the laser rays L are emitted from the emission holes 11a and become visible as a result of refraction of the laser ray against the water particles which form the fog.

If rotation of the cylindrical body 7 is sufficiently fast, the image which is formed is that of a cone of light C which envelopes the body of the car A like a hood - visible in Figure 4 - and which moves at the same speed.

The motor vehicle thus becomes clearly visible since it is enveloped by a long-range coherent light.

This makes the car visible in fog and its visibility even increases with an increase in the density of the fog since the refraction of the laser ray increases.

Preferably, the signalling device according to the invention will be installed in combination with the conventional incoherent-light signalling devices with rotating dishes which perform in an optimum manner signalling under normal environmental conditions, i.e. where there is no rain or fog.

Another embodiment of the signalling device is shown in FIG. 5 where it is denoted overall by 20 and differs from the embodiment described above owing to the presence also of generators/emitters which generate laser light rays diverging upwards.

This embodiment is particularly useful during search of vehicles and watercraft from the air.

A further embodiment of the invention, denoted in its entirety by 30, is shown in FIG. 6 and differs from the other embodiments owing to presence also, in addition to the laser light emitters L, of light emitters of the conventional type 31, for example incandescent or halogen lamps complete with rotating dish 32, which are housed in the revolving element 3.

From the above it can be understood that the optical signalling device according to the invention, in all the variations of embodiments illustrated and described, achieves the intended objects.

The signalling device according to the invention may be subject to numerous modifications and changes all falling within the scope of the accompanying claims.

All the details may be replaced by other technically equivalent elements and the materials may differ according to the requirements without departing from the scope of the invention.

The present application is based on and claims the priority of patent application No. VI2002A000143 filed in Italy on 1/7/2002, the disclosure of which is expressly incorporated herein by way of reference.

CLAIMS

1. Optical signalling device (1, 20, 30) for vehicles or transport means (A), comprising:

- at least one support element (2) fitted onto a vehicle (A);
- at least one revolving element (3) arranged on said support element (2) for rotation about a substantially vertical axis (X);
- drive means (4) acting on said revolving element (3) to promote rotation thereof about said rotation axis (X);
- one or more optical signalling elements (8; 31) associated with said revolving element (3) and electrically connected to an electric power source for illuminating them, each of said optical signalling elements (8) comprising laser light generators/emitters;

characterised in that said revolving element (3) comprises a cylindrical body (7) coaxial with said rotation axis (X) and housing internally thereof said one or more laser light generators/emitters (9),

said laser light generators/emitters (9) being arranged in a respective seat (11) with emission hole (11a) coaxial therewith, formed on the side surface (10) of said cylindrical body (7),

each of said seats (11) and said respective emission holes (11a) having a respective longitudinal axis (Y) inclined with respect to said rotation axis (X) of said cylindrical body (7),

said drive means (4) being so coupled to said revolving element (3) to promote the rotation of said cylindrical body (7) about said rotation axis (X) at a sufficient rotational speed to form a cone of light (C),

said cone of light (C) having its base directed towards the plane of travel (P) of said vehicle (A) and its vertex (13) arranged on said rotation axis (X) in such a manner to envelope the body of said vehicle (A) and move at the same speed thereof.

2. Optical signalling device (1, 20, 30) according to Claim 1, characterised

in that said laser light generators/emitters (9) are electrically connected to said power source by means of a rotating distributor (15).

3. Optical signalling device (1, 20, 30) according to Claim 1, characterized in that said drive means (4) comprise at least one electric motor.

4. Optical signalling device (20) according to Claim 1, characterized in that it further comprises laser ray generators/emitters (9) directed upwards.

5. Optical signalling device (30) according to Claim 1, characterized in that non-coherent light signalling means (31) provided with a rotating dish (32) are housed in said revolving element (3).

ABSTRACT

An optical signalling device (1, 20, 30) for a vehicle (A) comprises a support element (2) mountable on the vehicle (A), a revolving element (3) arranged on the support element (2) and having a substantially vertical rotation axis (X), one or more optical signalling elements (8) associated with the revolving element (3) and electrically connected to an electric power source. Each optical signalling element (8) comprises one or more laser light generators/emitters (9) housed in a cylindrical body (7) mounted on the revolving element (3) and defining the rotation axis. The laser light generators/emitters (9) are arranged in seats (11) with respective emission holes (11a) each having longitudinal axis (Y) inclined with respect to the rotation axis (X). Drive means (4) are coupled to the revolving element to promote rotation of the cylindrical body (7) at a sufficient rotational speed to form a cone of light (C) having its base directed towards the plane of travel (P) of the vehicle (A) and its vertex (13) arranged on the rotation axis.